

Solar Panel (PV) Buyers Guide

April 2022



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Land, Water and Planning 2020



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ISBN 978-1-76105-265-1 (pdf/online/MS word)

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Minister's Foreword

The Victorian Government is committed to delivering real benefits for Victorians by helping them take control of their energy costs, adopt renewable energy and provide a cleaner, better future for all Victorians.

The Solar Homes Program, announced in August 2018, is a 10-year, \$1.3 billion commitment made by the Victorian Government to support Victorians who install solar photovoltaic (PV), solar hot water systems, or solar storage batteries on their home.

More than 81,000 Victorian homes are already benefiting from collective savings of \$90 million on energy bills through the Solar Homes Program and there has been a significant increase in activity across the solar PV and solar hot water sectors. It's encouraging to see Victorian households embracing solar PV in record numbers.

From July 2019, the Victorian Government added new components to the Solar Homes Program, including interest-free loans, rebates for solar batteries, and a program for renters to access rooftop solar.

Victoria is leading the way in the renewables sector with new windfarms, large scale solar installations and solar PV across the state creating new industries and jobs while reducing energy costs. The Solar Homes Program is helping to create 5,500 solar industry jobs.

This guide is designed to provide Victorian households with the information they need to make an informed decision on what solar products can help them reduce their energy costs. To get the most out of a new system it needs to be planned and installed properly so that it serves your household for many years to come. A well-designed system can help lower household bills by up to \$890 per year, helping households to get the most benefit out of the system and reduce their carbon emissions.

We promised to put power back in the hands of Victorians and that's exactly what we're doing – helping people take control of their energy costs and make a real difference to the state's long-term energy future.

Hon Lily D'Ambrosio MP

Minister for Energy, Environment and Climate Change

Minister for Solar Homes

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Welcome

Installing a renewable energy system at home to help reduce household bills and greenhouse gas emissions is more popular than ever in Victoria, with significant rebates available to help you save even more. Rebates are available for solar panel (PV) systems for both householders and rental properties, solar hot water systems and for solar batteries. Interest-free loans are also available for solar panel (PV) systems to help further reduce the initial cost.

To get the most out of your system it needs to be planned and installed properly. A well-designed system can help lower your household bills as much as possible, helping you to get the most benefit out of the system. Choosing quality parts and components, and a reputable retailer and installer, will ensure you have a system that serves your household for many years to come.

The Solar Panel (PV), Hot Water and Battery Buyers Guides have been produced in conjunction with non-profit organisation [Renew¹](http://www.renew.org.au) to help you plan the right system for your home.

This Buyers Guide includes the types of solar panel (PV) systems available and factors to consider when making a purchase. Read the guide, do your homework and seek out independent advice, including visiting www.solar.vic.gov.au, before contacting retailers for quotes. When you're confident that you've found the right retailer and product for you, you can use their quote to begin applying for eligibility for a rebate.

¹ www.renew.org.au

Solar PV checklist: **What to consider before buying a system**

- ✓ *Check your eligibility for Solar PV rebate*
- ✓ *Confirm that your system can be connected to the grid*
- ✓ *Learn about solar panel types*
- ✓ *Find out why you need a good inverter*
- ✓ *Do you want a battery system one day?*
- ✓ *Work out how much energy you use*
- ✓ *Think about system size*
- ✓ *Seek out a reputable installer*
- ✓ *Double check any quotation*
- ✓ *Get a good warranty*

Section 1

Why install a solar electricity system at home?

Solar panels have become a common sight on Victoria's rooftops, helping to lower household energy bills across the state. Around 15 per cent of homes in Victoria already enjoy the benefits of having a solar PV system installed.

However, there are still many homes missing out on the benefits of a solar electricity system that can take advantage of the Solar Homes rebate to help fund a new system.



Grid-connected systems should pay for themselves between seven and nine years.

Installing solar has financial benefits

Many households want to know if their bill savings will be big enough to justify a solar electricity system.

The clearest answer to this can be found by working out the payback time of a proposed system, which is how long it takes for electricity bill savings to cover the installed system cost, and the annual bill saving, which shows the ongoing financial benefit after the payback period has been reached.

Non-profit organisation Renew has a [free Solar and Battery Advice Calculator](#)² to help you work out the cost, bill savings and payback times of a planned solar PV system, with or without batteries, in just a few minutes.

DELWP energy also have [Solar Calculator](#) on the [Victorian Energy Compare](#) website³.



With the Solar PV Rebate a system in Victoria could pay back within three and five years.

² <https://renew.org.au/free-solar-and-battery-advice/>

³ <https://compare.energy.vic.gov.au/solar-calculator>



Photo: Greg and Maria Churm

With the Solar PV Rebate, a system in Victoria could pay back within three and five years. Today's grid-connected systems should pay for themselves between seven and nine years in Victoria *even without the solar panel rebate*, depending on factors such as location, energy retail tariffs and household electricity consumption patterns.

Quality solar panels last at least 25 years, so that initial investment should repay several times over compared with the cost of buying electricity from the grid⁴.

Each system installed helps the environment

Many people are focused on the environmental benefits when choosing to install a solar system. Although solar systems still have an environmental impact through the resources required to produce them, such as lithium used in batteries, they create far less of an environmental impact than electricity generated by fossil fuels.

They also do not create any greenhouse gases when generating or storing electricity, helping households to reduce their greenhouse gas emissions and their impact on climate change. As a bonus, any solar generation that a household doesn't use themselves is sent back to the electricity grid and ultimately used by other households, reducing *their* environmental impact, too.

Using solar to change your electricity usage

There are several ways you can shift some of your electricity usage to the middle of the day, where you can make much better use of the solar energy you generate. Alternatively, solar batteries can be used to store energy usage above the level produced by solar panels.

Energy efficient heat pumps are another way to save on bills, and when combined with solar PV can "soak up" the generated energy through the day and store it in the hot water for your home.

⁴ Calculations are based on a 3kW to 5kW system with no export limits and with a conservative feed-in tariff of 10 cents per kilowatt-hour.

Section 2

What rebates and incentives are available to Victorians for solar electricity systems?

A solar panel (PV) system is a significant investment, with the Solar Panel (PV) Rebate helping to make systems more affordable for Victorians.

Solar Panel (PV) Rebate

Victorian residents can apply for the solar panel rebate to help pay for the cost of a new solar panel system. In 2020-21, the solar panel rebate gives Victorian households a discount of up to \$1,850 off the upfront cost of a solar PV system.

Not-for-profit community housing providers are also eligible to apply for the rebate on behalf of their tenants.

Find out more about the solar panel rebate on the Solar Victoria website: www.solar.vic.gov.au



The solar panel (PV) rebate gives Victorian households an upfront discount on the cost of installing a solar system.

Small-scale Technology Certificates (STCs)

Your new system is also eligible for Small-scale Technology Certificates (STCs). This is effectively a payment made to purchasers of small renewable energy systems for the value of the emissions reduction they create. The quoted price of the system from your installer will have the STC discount included in the final price.

Selling your surplus electricity with Feed-in Tariffs (FiTs)

Any excess electricity generated at home throughout the day can be sold to the grid through your electricity retailer for a feed-in tariff, which is a fixed rate paid to households per kilowatt-hour (kWh) of electricity exported to the grid. Feed-in tariffs vary across states and territories, between retailers, and in some states, even across distribution networks.



Not everyone will be able to feed excess energy into the grid and your local distribution network service provider should inform you if this is the case.

It's a good idea to investigate whether you will be able to feed excess energy into the grid before buying a system.

Victoria has minimum tariffs set every financial year by the Essential Services Commission, and electricity retailers must pay these or higher rates.

Find out more about Victoria's feed-in tariffs at the [Essential Services Commission website](#)⁵.

Compare offers from retailers at Victoria's [Energy Compare website](#)⁶.

Case study: Millsom family of Coburg embrace Solar Homes Program to save money and the environment



The Millsom family of Coburg in Melbourne's inner north received a rebate in early 2019. After six months with the solar panels, they recommend the Solar Homes Rebate Scheme to anyone interested in saving money and the environment.

"We're generally halving our cost every month that we've had it and we got the solar panels in January and so that includes the last month we've actually made more power than we use, which is really cool."

Read more at: solar.vic.gov.au/case-study-millsom-family

5 <https://www.esc.vic.gov.au/electricity-and-gas/electricity-and-gas-tariffs-and-benchmarks/minimum-feed-tariff#toc-current-minimum-feed-in-tariffs>

6 <https://compare.energy.vic.gov.au/welcome>

Section 3

Grid-connected solar explained

Find out how your new solar electricity system will help your house interact with the electricity grid, drawing electricity when needed and feeding any surplus back into the grid.

How does grid-connected solar work?

Most solar customers choose a mains grid-connected system for the reliability that such a system offers. Your home can draw electricity from the grid when insufficient electricity is being generated by the solar panels. Any electricity produced by the solar electricity system but not needed by your house at the time it is produced is simply fed into the mains grid, with a feed-in tariff paid to the system owner. Check with your energy distributor that your household will be able to feed excess energy into the grid.

Grid-connected systems have two main components, the solar panel array on the roof, and a grid-interactive inverter, connecting into the household's switchboard and electricity meter.



Any electricity produced by the solar electricity system but not needed by the house at the time it is produced is simply fed into the mains grid, with a feed-in tariff paid to the system owner.



Grid Connection

Approval for grid connection from your Distribution Network Service Provider (DNSP)

The DNSP is the business that owns and operates the electricity network – poles and wires – in your area. They are responsible for the physical connection of your system, and house, to the electricity grid.

The process and technical details for grid connection will vary depending on your specific electricity distributor.

Find your electricity distributor on the [Electricity Distributor section of Victoria's Energy website](#)⁷.

Pre-approval for grid connection

Before you proceed with installing your solar system, you may be required to get pre-approval for grid connection from your Distributor.

Pre-approval ensures that your system will be able to be grid connected once it is installed.

Not everyone will be able to feed excess energy into the grid and your distributor should inform you if this is the case.

System size and grid connection

For most small systems (up to 5kW) and in most locations, the process of grid connection is streamlined.

Your distributor will advise you of your 'export limit'; which dictates how much excess solar generation you can feed back into the grid for a feed-in-tariff. These limits should be considered when selecting the size of your system.

For systems larger than 5kW, you may be subject to a negotiation process with your distributor for grid connection.

Speak to both your distributor and solar installer first and find out as much information as you can with regards to likely timeframes, information requirements and costs. You may need to engage an energy professional to assist you to negotiate the grid connection process.



Solar Savvy Tip:

You should check your eligibility to export with your distributor before you install.

⁷ <https://www.energy.vic.gov.au/electricity/electricity-distributors>

Section 3

Grid-connected solar explained

Grid connection and your energy retailer

To complete your grid connection, your energy retailer also needs to be informed.

You may need to have your meter reconfigured to measure solar feed-in and change your electricity offer (their supply contract with you, to reflect the feed-in tariff or price you are charged for energy use).

Your solar installer may contact the retailer on your behalf, or you may need to do it yourself.

In any case, after the solar installation is complete you should double-check with your energy retailer to make sure it's properly connected and your solar feed-in is being recorded properly.

System components: panels + inverter

Solar panels

Solar panels are made from many solar cells connected together, with each solar cell producing DC (direct current) electricity when sunlight hits it.

Find out more about solar panels in *Finding the right solar panels for your system*.

Inverters

A solar inverter is a vital part of a grid-connect solar electricity system as it converts the DC current generated by your solar panels to the 230 volt AC current needed to run your appliances.

A grid-interactive inverter is the most common type of inverter. It requires the mains grid voltage to be present or it will shut down for safety.

This means that if there is a power failure, your solar system will shut down and will not supply energy until after the mains grid returns to normal.

Hybrid, or multimode, inverters exist as well, which are designed to work with a battery (if one is installed) and as a grid-interactive inverter as well, allowing you the best of both worlds. Hybrid inverters can feed energy into the grid from either the solar array or the battery bank.



Some hybrid inverters can be installed in such a way that they can isolate themselves from the grid and continue to provide power from solar panels and batteries if the grid is down.

Find out more about inverters in *Finding the right inverter for your system*.

Below are some of the key issues to consider and discuss with your system installer and distributor.

Technical specifications

The technical and other requirements specified by distributors for grid connection are more prescriptive than of the Australian Standard for grid connected energy systems via inverters (AS4777) and those specified by state or territory regulators. Your installer must be aware of these technical specifications for connection to your specific electricity distributor.

Connection agreement and charges

The process and guidelines for obtaining grid connection vary significantly between distributors. Distributors are required to negotiate 'in good faith' a 'fair and reasonable' agreement and charge for connecting your system to the network. In reality, the costs can vary significantly depending on your location, distributor and retailer. Check and clarify these costs, and the process, early and often.

Metering

Grid connection requires an electricity meter that allows recording of bi-directional electricity flow to measure energy going to and coming from the grid. Most Victorians have Smart Meters, which can do this already. But if you are one of the small number of Victorian households without a Smart Meter, you will need to upgrade. Speak to your distributor about the process for this, and whether there will be any cost.

Section 3 Grid-connected solar explained

What about batteries?

One way of maximising household use of solar electricity is to store it in a battery for use when you need it, rather than when it is generated. Battery systems have been around for a long time but have been complex and generally too expensive to consider with grid-connect solar PV systems. That is changing with the introduction of simpler modular battery systems, which means that you can start with just one battery unit and add more if and when needed.

Current battery costs may not make them a suitable investment for every household, though we expect prices to continue to fall over the coming years.

The Solar Homes battery program is significantly improving the affordability of batteries, with homeowners in designated areas able to apply for a significant rebate on the cost of a battery storage unit. Customers can claim only one rebate from those offered by Solar Victoria.

When buying a solar panel system you should consider whether you want to ensure that it is also battery-capable if you want to upgrade.

Solar Victoria's *Battery Buyer's Guide* will be released in 2020.

Find out more about the [Solar Battery Rebate](#)⁸.

⁸ <https://www.solar.vic.gov.au/Solar-rebates/Solar-batteries>



Solar Savvy Tip:

We recommend talking to your installer about systems that are battery capable. This means that you will be able to add a battery to your system in the future.



Section 4

Finding the right solar panels for your system

There are no moving parts to wear out in solar panels, just solid-state cells that have very long lifespans. Each cell type and panel have some advantages and disadvantages, though.

Types of solar panels

There are three common types of solar cell: monocrystalline, polycrystalline and thin film. They are made in different ways and have different performance qualities. If you're interested in the detail of their different manufacture techniques, performance characteristics, and the pros and cons of each, find out more in *Renew* magazine's [Solar Panel Buyers Guide](#)⁹. Otherwise, the important thing to know is that regardless of the panel type, the specifications of solar panels show their capacity, price, expected lifespan and other performance characteristics that determine what their energy output will be. These specifications are discussed here.



A larger wattage system will generate more energy in the same installation, but actual energy generation will depend on many factors, such as sunlight hours, clouds, temperature, shading and panel orientation.

⁹ <https://renew.org.au/renew-magazine/buyers-guides/solar-panel-buyers-guide/>



Why is panel wattage and size important?

When buying a solar panel system the main specification to be familiar with is the system size in watts. For example, a 3kW system may be made up of twelve 250 watt panels. This watt specification is known as the rated peak power, which is the maximum power generated by the panel under the manufacturer's test conditions. But what does panel wattage mean for energy generation?

A larger wattage system will generate more energy in the same installation, but actual energy generation will depend on many factors, such as sunlight hours, clouds, temperature, shading and panel orientation. As a rough rule of thumb, find out the average peak sun hours per day in a particular location to get the average energy generation over a year. For example, a 4kW system in Melbourne with average peak sun hours of around 4.6 should theoretically generate around 14.5 kWh of electricity per day, on average, over a year—more on sunny days and less on cloudy days; more in summer and less in winter.

For example, it's common for solar systems in Victoria to generate more than twice as much in December as July.

Some solar panel manufacturers and retailers have solar output calculators on their websites to help you work out how much energy a proposed system might generate.

When to use larger wattage panels and smaller wattage panels

Using panels with a larger wattage means that fewer panels need to be installed. This simplifies installation, making it faster and cheaper. However, panels of any size can be used for any type of system. For odd-shaped roofs a larger number of smaller panels may enable more generating capacity than fewer larger panels, but the final cost of the installation will most likely be higher.

For more information visit:
www.choice.com.au/home-improvement/energy-saving/solar

Section 4

Finding the right solar panels for your system

Advice on panel quality and selection

Quality counts at the cell level but the overall manufacturing of panels is also crucial. If assembly systems are substandard, some issues can arise that may shorten the life of solar panels or cause increased degradation over time.

One such issue with crystalline cells is that of microcracks—tiny cracks in the cells that can enlarge over time with thermal cycling (as the panels heat up and cool down each day) or with poor handling practices. Microcracks have the potential to reduce the current generating capacity of any cells affected, and hence the overall output capacity of the panel.

How can you really tell which panels have been manufactured to the highest standards?

Some solar businesses may refer the 'tier system'. For example, they may say that their panels are Tier 1, 2 or 3.

The tier system relates to the reputation of the manufacturer and solar industry analysts assign panel manufacturers into one of three groups, with the big long-standing manufacturers with a good reputation for quality and performance in Tier 1, and smaller, newer manufacturers in Tiers 2 and 3.





Solar Savvy Tip:

If you have limited roof space, panels with higher efficiency will mean you can fit more generation capacity than you could with lower efficiency panels.

The Clean Energy Council maintains a list of all solar modules (panels) and inverters that meet Australian Standards for use in the design and installation of solar PV systems. This is a more reliable indicator of good quality panels.

To be eligible for rebates, including the Victorian solar panel (PV) rebate, panels sold in Australia must have Clean Energy Council approval, demonstrating that they have been tested and meet Australian and international standards.

Panel efficiency

Panel efficiency is a measure of the output of the panel in relation to its collection area. Currently, panel efficiencies are in the range of around 4% to 22%, with most being in the 14% to 18% range. If you have limited roof space, panels with higher efficiency will mean you can fit more generation capacity than you could with lower efficiency panels. Of course, higher efficiency panels will generally cost more, too.

Panel efficiency is largely dependent on the technology used, though, and isn't necessarily an indicator of quality.

Case study: Solar adds to a sustainable lifestyle



Peter and Di are self-funded retirees so getting the most from their energy-saving is important.

“Being able to tap into the rebate program was a great help,” said Peter. “We’d been thinking about solar for some time, but being able to get some extra help from the government has really made a difference.”

Read more at: solar.vic.gov.au/solar-adds-sustainable-lifestyle

Section 4

Finding the right solar panels for your system

Power tolerance

If a panel has a power rating of 250 watts with a tolerance rating of + or - 5% then this means that the actual panel wattage could be 5% more or 5% less than 250 watts. Higher quality panels tend to be under-rated and so have a positive power tolerance rating, for example '+5%'.

Testing and consumer feedback

There are a number of other testing and certification systems that can help identify higher quality panels. The Clean Energy Council's [Approved Solar Modules list](#)¹⁰ indicates which panels also meet these higher standards:

- *VDE Quality Testing and IEC 62941 Certification* are two quality standards for solar PV module durability that meet a higher level than the International Standard
- *IEC 62804 Certification* is an international standard for crystalline solar PV modules' durability against degradation caused by high voltages
- *IEC 61701 Certification* is an international standard for resistance against salt mist corrosion for solar modules installed in coastal areas.

The Clean Energy Regulator also has a solar module validation scheme for solar installers to check that the panels they are installing are genuine, and on the approved solar modules list. Ask your installer whether they are participating in the Solar Panel Validation (SPV) Initiative.

The Desert Knowledge Solar Centre has tested numerous solar panels and the results are published on their website. Based in Alice Springs, the DK Solar Centre has around 37 individual solar arrays of various brands and models being continuously tested.

Read the data at the [Desert Knowledge Solar Centre website](#)¹¹.

You can also have a look at the [DNVGL PV Module Reliability Scorecard](#),¹² which certifies solar panels based on a series of tests.

Another source of information on panel quality is from those who own them. Solar system owners like to write reviews on their systems, both good and bad, so look around in the popular forums for owner experiences. One of the most popular Australian forums is [Whirlpool Green Tech](#)¹³.

¹⁰ <http://www.solaraccreditation.com.au/products/modules/building-approved-modules.html>

¹¹ <http://www.dkasolarcentre.com.au/>

¹² <https://www.dnvgl.com/news/2018-pv-module-reliability-scorecard-121786>

¹³ <http://forums.whirlpool.net.au/forum/143>



Systems with batteries usually have a different inverter – and when adding a battery to an existing system it’s not uncommon to replace the inverter.

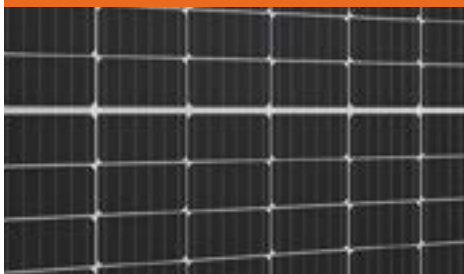
If I’m planning to get batteries down the track, which panels should I get?

The solar panels used in systems with batteries are no different to those used in systems without batteries. Systems with batteries usually have a different inverter and when adding a battery to an existing system it’s not uncommon to replace the inverter, however it’s not always necessary. Alternatively, you can add a second inverter, and some battery systems come with them included. For more information, see ***Finding the right inverter for your system.***

Recent developments in panel design

A variant on crystalline cells are PERCs (passivated emitter and rear cell). Already in use in some modules, these are designed for higher efficiency by reducing recombination in the cell (where electrical charges recombine before they have a chance to be used); however, this currently comes at a price premium.

Another recent development is the ‘half-cell’ or ‘half-cut cell’ panel. Instead of 60 large cells for example, the panel may have those 60 cells cut in half to form 120 cells half the size. This means that the connections between the cells are carrying half the current, reducing resistive losses by a factor of four. Not only do half-cut cell panels produce greater output than full cell panels, they also have better shade tolerance as they have twice the number of cell strings, so a smaller area is affected if just one cell is shaded.



Section 5

Finding the right inverter for your system

Choosing an inverter may not be the first thing that comes to mind when you're thinking about installing a solar or solar plus a battery system. But every one of the two million solar systems already installed in Australia includes an inverter, which can be thought of as the heart of the system—if it's not working, your solar generation is wasted.

In a nutshell, an inverter takes electricity from a power source that produces 'DC' electricity, such as solar panels or a battery system, and converts it into mains-equivalent 230 volt 'AC' electricity ready for use in your house.¹⁴

Why you need a good inverter

It is important to have a good inverter. In grid-connect systems, an inverter failure means your solar panels are doing nothing until the inverter is repaired or replaced.

Still, it's worth remembering that even the best inverter is unlikely to last as long as the rest of your system. Solar panels should last more than 25 years, but inverters are not generally expected to last much more than 10 or 15. You can expect to replace your inverter at least once over the life of your solar PV system.

¹⁴ AC (alternating current) and DC (direct current) are two different forms of electricity. Mains electricity is AC and powerpoints and light fittings put out AC electricity, but many small household appliances convert it to DC before using it.



Photo: Enphase

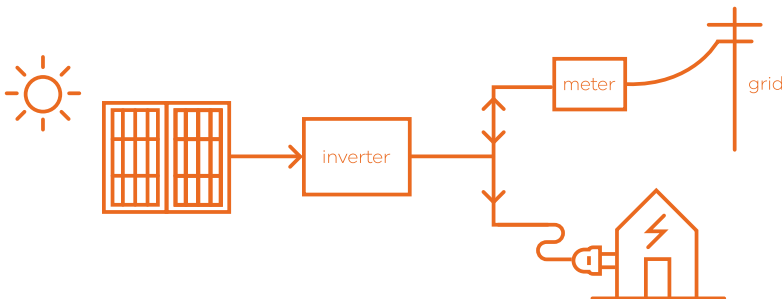
Which inverter for your needs?

Grid-interactive inverter

Most currently installed grid-connected solar PV systems use a grid-interactive inverter. A grid-interactive inverter converts the energy from solar panels into mains power and feeds it into the house's electrical wiring. The panels are connected to the inverter as a series of connected strings with each panel feeding into the one following it, much like fairy lights. If one panel suffers reduced output, such as by shading, it can affect all panels in that string. As indicated by the name grid-interactive, these inverters can export energy into the grid, and require a grid connection (or an equivalent 230 volt AC supply) to operate; if the grid goes down (i.e. a blackout) then they stop operating.

Microinverter

Another type of grid-interactive inverter is the microinverter, which is designed to be mounted on the back of a solar panel to make the panel itself a grid-interactive module. These are ideal for those who want to start small and increase their system over time, or for systems where the array may be partially shaded. In a solar system using microinverters, each panel is independent of the others and not affected if other panels are shaded.



Section 5 Finding the right inverter for your system

Hybrid inverter

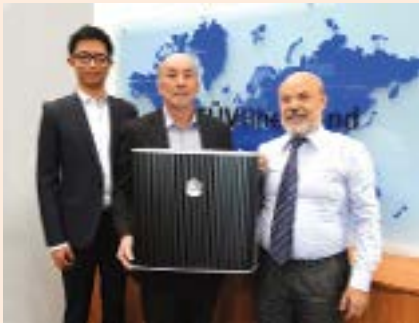
When a system also includes energy storage (batteries) it gets a little more complex, as the inverter needs to deal with charging and discharging the battery in addition to generation (solar panels) and the grid.

Systems with batteries often use a more complex type of inverter called a hybrid inverter, which can feed energy into the grid from either the solar array or the battery bank. Many hybrid inverters can also power the house from the batteries and solar during a power failure, in effect becoming a large UPS (uninterruptible power supply). They can also charge the batteries from the grid.

This makes many hybrid inverters true bi-directional devices, and many, if not most, can handle all of the energy flows in a home energy system. Some can even divert the excess solar energy to a particular load, such as a water heater, replacing the need for a separate device, known as a solar diverter, for this purpose.

However, hybrid inverters are not essential for solar PV systems with batteries. Batteries can be used with standard grid-interactive inverters or with microinverters, usually by adding an extra inverter, or by using a battery with a built-in inverter. These types of setups, though, don't necessarily have all the extra features of hybrid inverter-based systems.

Case study: **Made in Victoria – Eclipse visible in Melbourne's west**



Local design for Australian conditions and long-lasting product quality are two of the keys to success of West Footscray power electronics manufacturer, MIL-Solar which makes inverters for the Australian and world markets.

MIL-Solar employs around 20 people in design and construction of solar inverters that are priced to compete with the top European brands.

Read more at: solar.vic.gov.au/made-victoria-eclipse-visible-melbournes-west



Solar Savvy Tip: If you are going to undersize your inverter, the solar array can be no more than 33 per cent higher capacity than the inverter for the STC rebate to be applied, for example, 6.6kW of solar panels on a 5kW inverter.

Sizing your inverter

In systems using a grid-interactive inverter, the inverter is usually sized to match the solar array. For example, if you have a 5kW solar array, then you would install a 5kW inverter. However, inverters can also be undersized or oversized for different reasons.

Undersizing the inverter (usually referred to as overclocking the inverter or oversizing the solar array) might be done because inverters operate more efficiently when operating near capacity, and solar panels spend most of their time generating below their rated maximum. Solar panels have become cheap enough that the small amount of generation lost when they are running at full capacity with an undersized inverter is usually worth less than the additional cost of a larger inverter – especially when you consider the extra energy captured by the improved efficiency when the panels are generating below their rated capacity.

If you are going to undersize your inverter, the solar array can be no more than 33 per cent higher capacity than the inverter for the STC rebate to be applied, for example, 6.6kW of solar panels on a 5kW inverter.

Oversizing the inverter allows for expansion of the solar array at a later time if desired, and also means the inverter is less stressed at times of maximum generation. The difference in price for a slightly larger inverter may be small in many cases. However in practice, few households add to their solar array after it is installed, and if they do they often find that changes to standards mean they have to replace the inverter anyway. If you are planning to expand your array in the future, speak with your installer about what might be involved.

Sizing an inverter for a hybrid energy system is a more advanced task that really should be left to the installer, with input from you on power output requirements. There are a number of factors that will determine the hybrid inverter's ratings, including the size and output capability of the battery bank, the loads the inverter must power, and whether it has to be able to run in UPS mode as a backup power supply when the mains grid fails.

Section 5

Finding the right inverter for your system

Inverter monitoring and connectivity

All inverters have some way for users to monitor their performance and activity. In its simplest form, this might include coloured indicator lights or text-based or graphical displays that show all the parameters of the inverter, including (depending on the inverter type) battery voltage, current and state of charge; solar array voltage and current; 230 V AC output voltage, current and power, including peak power; and various status and mode displays.

Many inverters have network connectivity using Wi-Fi or ethernet and can upload data to web portals for the owner to see – and share if they want to. Many can connect directly or via the web with smartphone apps that give access to stored and real-time data. Being able to monitor your system remotely is far more useful than having to go outside and look at the display from time to time, so consider this when choosing an inverter. The range of parameters that may be reported and recorded can be vast, including those mentioned above as well as energy consumption of the home, energy exported to the grid or diverted to a specific appliance (such as a hot water system), support energy provided by the battery, battery temperature, inverter temperature, ambient temperature, and any errors that may have occurred.

All this information is useful because it can tell you how well your system is working and show if a problem arises. But some of the information is complex and difficult to interpret without the necessary knowledge or experience. Subscribing to a monitoring service – where a specialist business monitors your system performance and alerts you if something goes wrong – could well be worth the additional cost if it saves you from losing your free energy and feed-in-tariff payments for an extended period of time.

As inverters become more advanced and systems become more complex, the need for inverters to talk to other system components, and even control those components, is growing. Some inverters have these capabilities already, making integrating compatible components, such as grid-interactive inverters into an AC-coupled hybrid system, much simpler.

Cost of an inverter

Costs vary significantly by size and quality. As inverters are an essential part of a solar PV system, they are usually included as part of the whole package so their price may not be apparent unless you ask your installer. For a good quality 5kW grid-interactive inverter, expect to pay between \$1,000 (for a low-cost but dependable one) and \$2,000 (for a premium inverter with extra features).

Hybrid inverters, which also have the capacity to operate from batteries and often contain a high capacity battery charger, are more expensive, with 5kW models costing between \$2,500 (budget) and \$5,000 (premium).

Approvals and certification

All inverters designed for permanent installation must meet the relevant Australian Standards. Grid-interactive and hybrid inverters and inverter-chargers must also have ESAA (Electricity Supply Authority of Australia) approval before they can be connected to the grid, so check for this also.

It is unlikely that you would find any inverters for sale in Australia without these approvals. However, it is easy to buy inverters and other equipment online from almost anywhere, so if you intend to claim a rebate for your system, the inverter will need to meet all approval requirements.

The Clean Energy Council maintains a list of approved inverters that meet Australian Standards for use in the design and installation of solar photovoltaic (PV) systems.

The Solar Homes program requires the installation of inverters that meet Australian Standards and are *IEC 62116 Certified* (a safety measure) and have *Volt-Watt* and *Volt-Var* response ability (to help manage grid stability in areas where lots of solar PV systems are installed). The specifications sheet for your inverter should have this information, or you can ask your installer. Most inverters on the market meet these requirements.

Section 6

Planning your solar electricity system

There's a lot to consider when planning a solar electricity system for your home and one factor will influence another. Household energy use, for example, will determine for instance household energy use will determine what size system you need.

Get the right advice

Remember to seek out independent advice to plan your system. Non-profit organisation Renew offers a range of [advice services](#)¹⁵ to anyone looking to invest in energy saving systems for the home.

The Victorian Government also has a range of programs and initiatives to help households plan for their energy needs. Visit the Victorian [Energy Saver website](#)¹⁶ for more details.

Work out how much energy you use

Your household electricity use is recorded on electricity bills measured in kilowatt-hours (kWh). Look for a figure that gives average daily usage, and review as many bills as you can to see how this figure varies throughout the year.

Your Smart Meter records your electricity usage every half hour, and this data can give you a much more detailed view of your electricity usage, including how it varies at different times of day and on different days of the week. You can download a spreadsheet of your Smart Meter data from your electricity distributor¹⁷ – however unless you know how to use spreadsheet software (such as Microsoft Excel) to understand what the data can reveal, it may not be useful to you. Fortunately, all the Victorian electricity distributors have online portals that you can log in to and see detailed information about your electricity usage displayed in an easy to understand form.

¹⁷ The distributor is the company that owns the poles and wires in your street and transports the electricity to your home. This is the business you call to report faults and emergencies and is different to your electricity retailers who sends you your bills.

¹⁵ <https://renew.org.au/resources/advice/>

¹⁶ www.victorianenergysaver.vic.gov.au



To find out which distribution network you are in, you can look on the back of your electricity bill or go to the [Electricity Distributors section of Victoria's Energy website](#)¹⁸.

The four Victorian distribution network web portals are:

- CitiPower and Powercor:
www.powercor.com.au/our-services/myenergy
- United Energy:
www.energyeasy.ue.com.au
- Jemena:
www.electricityoutlook.jemena.com.au
- Ausnet Services:
www.myhomeenergy.com.au/login

Energy advice businesses may also use your smart meter data to give you advice about your usage, or to help you plan a solar PV system.

It's worth also reviewing your gas bills. If your gas use is high then, over time, inefficient gas appliances can be replaced with modern electric ones to make the best use of your solar electricity system, but this means your electricity consumption will be higher.

When planning a solar electricity system for the home it's useful to know how much energy is used by certain appliances as well. You can use this information to consider replacing older 'energy guzzling' appliances, right through to what time of day you might use these appliances, to make the most of the solar electricity generated.

You can use an energy meter such as a *PowerMate Lite* or *Reduction Revolution Plug-in Power Meter* to measure the electricity used by certain appliances. Likely problem appliances include old fridges and freezers, older washing machines (especially top loaders if you do warm washes), portable electric heaters such as bar radiators, fan heaters, oil-filled column heaters and panel heaters, older air conditioners, electric hot water systems and pool pumps, which all have more energy efficient alternatives or energy efficient versions on the market now. It's important to use a good quality energy meter or your readings could be inaccurate, particularly when measuring certain types of loads such as the power supplies in modern electronics.

¹⁸ <https://www.energy.vic.gov.au/electricity/electricity-distributors>

Section 6 Planning your solar electricity system

Examples of household energy culprits and energy use

Halogen downlights are one of the biggest power wasters in the home because they convert nearly all of the energy they use into heat, not light. Replacing 50 watt halogen light bulbs with 10 watt LED bulbs can equate to 80 per cent less energy use for lighting.

This example applies to many appliances in the home and spending a few hundred or even a couple of thousand dollars on more efficient appliances could save you a great deal more than this in energy costs.

As an example, you might monitor your fridge for a week using an energy meter and find that it's using 4 kWh per day. This is a lot for a domestic fridge, so it might need to be repaired (it might just have damaged door seals or need regassing), cleaned (it might be full of dust at the back) or replaced.

For loads that you can't monitor directly with an energy meter, such as ceiling lighting and fans, energy use can be worked out with a simple calculation. For example, a 50 watt light used for four hours per day will use 200 watt-hours per day or around 1.4 kWh per week.



Improving energy and thermal efficiency at home

Efficient electric appliances

A number of older gas and electric appliances have modern electric equivalents these days. Even without a solar PV system installed, households can save on bills and greenhouse gas emissions by upgrading old appliances with new efficient models. From hot water heat pumps, reverse cycle heating and cooling systems, LED lighting, induction cooktops, washing machines right through to personal heating, there are modern electric appliances that usually cost less to run than older appliances, including gas appliances, especially when your solar PV system powers them some of the time. If you have a plan to replace all of your gas appliances with electric appliances, you will also eliminate the monthly connection charge.

Visit [Renew's Energy Efficiency and Appliances](#)¹⁹ page for more information.

When replacing appliances, comparing the energy consumption of different models is often simple, as many appliances such as fridges, dishwashers and washing machines are required to carry an energy ratings label. The label has two energy usage indicators: the star rating (the more stars, the more efficient the appliance) and the annual energy use in a typical situation (the lower the number, the less energy it uses).

Find out more about the Energy Ratings label at the [Energy Rating website](#)²⁰.

Make your home thermally efficient to save on running costs

Another step to preparing your home for a solar PV system is to make sure your home is well-sealed to reduce the energy use of heating and cooling systems. If you added up all the areas where air leaks occur you could have the equivalent of a one square metre hole in your wall! In winter, leaks allow your hard-won heat out and the winter cold in; in summer, they allow in the hot outside air and if you are running your air conditioner, your cool air will literally escape out the door.

Case study: Five in the house and a power bill of \$30 a month...it could be you



Annelies Brandjes is getting power bills of \$30 a month in her new home ... Her father, Jan, who has been working on energy efficient buildings for more than 36 years in Victoria and northern Canada's freezing Yukon region knew adding solar panels was just part of the way to cut energy costs and make the house more comfortable.

Read more at: solar.vic.gov.au/five-house-and-power-bill-30-month-it-could-be-you

¹⁹ <https://renew.org.au/resources/how-we-can-help/efficient-electric-homes/appliances/>

²⁰ <http://www.energyrating.gov.au>

Section 6 Planning your solar electricity system

There's plenty that can be done to retrofit and fix a draughty home to make it more energy efficient to live in, from sealing doors and windows to installing insulation.

Keep in mind that some types of gas heaters ('open-flued') require some ventilation to operate safely. The vents installed in the walls near the ceilings of older homes are generally sufficient. But you should seek expert advice if you are retaining older open-flued gas heaters when draught-sealing a home. Similarly, if you have gas cooking you will need a rangehood with an extraction fan if you are draught-sealing.



Here are a few tips to get you started, or consult an expert about making more substantial retrofits such as insulation or double glazing.

Sealing doors

This can be done by applying weather-stripping around the door or attaching a seal to the bottom of the door.

Seal fans and chimneys when not in use

Fitting a DraftStoppa²¹ to your exhaust fans helps seal the home from the ceiling space. These work by using the force of the fan to lift covers up, with gravity keeping things sealed otherwise. You can also buy replacement exhaust fans that are designed to block the opening when not in use. Also, remember to block off chimneys when not in use with a chimney draught-stopper product such as a Chimney Sheep or ecoMaster Chimney Draught Stopper.

Seal off skylights

This can be as simple as fitting a sheet of clear plastic at the bottom of the skylight shaft, or you can employ professional solutions.

Consider pelmets

Fitting pelmets to your windows greatly reduces the air circulating down between the window and the curtain.

Downlights

Downlights can be a source of 'leakage'. Every place you have a downlight you have a break in your insulation. Remove downlights from your ceiling and bring the fixture within the room 'envelope', or install downlight covers.

²¹ <http://www.draftstoppa.com.au/>

Planning an all-electric home

Some households might plan to switch off their gas supply entirely and go all-electric at home. This saves on gas supply charges and means that more appliances in the home can use solar-generated electricity.

An all-electric home benefits if the solar panel (PV) system is sized appropriately to cover most electricity use, although any shortfall can be made up with electricity from the grid. All-electric homeowners pay careful attention to efficiency, including the selection of efficient electric appliances such as reverse-cycle heating and cooling and heat pump hot water systems.

A battery system can further reduce electricity bills by storing excess solar to run electric appliances at night, but before taking this step you should figure out whether the cost of buying and installing the battery, and the foregone feed-in-tariffs, will be lower than the money you will save on bills.

If going all electric is something that interests you, visit [Renew's Efficient Electric Homes page](#)²² to find out more.

²² <https://renew.org.au/resources/how-we-can-help/efficient-electric-homes/>



Section 6 Planning your solar electricity system

Working out the right-sized system for your home

This is where you take all the household energy use information gathered, as well as any plans you have to go all-electric to work out what size system suits your needs.



The bigger is better approach

Modelling by non-profit organisation Renew shows that a larger system can have a shorter payback time, which is the number of years until bill savings recoup the installation cost.

The shorter payback periods were found in particular on larger systems of 4 to 6 kW and were due to higher feed-in tariffs when combined with a lowering in the price of a solar system installation.

Things can change with changes in government policies, FiTs and STC prices (the federal rebate for solar's contribution to the RET), so evaluate quotes at the time of purchase to estimate your payback period and determine the best system size for your situation. Renew has a [free online tool](#)²³ that can help with this, or you can get targeted advice via a full solar energy consultation. You can also check Solar Choice's [Residential Solar System Prices](#) guide, updated every few months²⁴.

²³ <https://renew.org.au/free-solar-and-battery-advice/>

²⁴ <https://www.solarchoice.net.au/home-solar-system-prices>



Solar Savvy Tip: Electricity distributors may limit the size of solar systems connected into their grid. Confirm the process for larger systems with your distributor.

Constraints on big solar systems

If bigger is better, how big should you go? Roof space is an obvious factor. Most people have budget constraints and have to prioritise their spending. Don't ignore other investments that may pay off even quicker, such as insulation, gap sealing, window shading, LED lights and efficient appliances.

Electricity distributors may limit the size of solar systems connected into their grid. If you've got a normal residential single-phase connection, solar systems up to 5 kW in size are usually no problem, however, going larger often requires extra paperwork or may not be allowed. Confirm the process for larger systems with your distributor. The limit is based on the inverter capacity, not the total capacity of the solar array – this is one reason it has become more common to oversize the solar array by up to 33 per cent above the inverter capacity (a 6.6 kW solar array on a 5 kW inverter).

Your distributor may also limit the amount of excess energy that can be fed back into the grid for the feed-in-tariff. This could affect the payback period and the total value you get from the system, so again, verify this with your distributor before you proceed. *Refer to "Grid-connected solar explained" on page 14* for more information.

Smaller systems designed to match energy use

Many people might not be able to afford a larger system. The following advice applies to systems sized to match efficient household electricity use, which will still result in bills savings and help the environment.

First decide how much energy you want the system to produce. Do you want to offset your entire electrical energy use, or just a given portion? You can determine your energy use from recent energy bills or smart meter data, although you should also consider whether your energy use will reduce after any energy efficiency measures, or rise after purchasing additional electric appliances or an electric car.

Think about how much electricity you use during the day when the sun shines and the solar system will be generating. With a feed-in tariff lower than the rate you currently pay for electricity, the solar generated electricity will be of greatest value when it is consumed on-site, as opposed to being exported into the grid.

Think about how this daytime electricity generation can be used to run appliances, even if you're not at home, such as a heat pump hot water system or even setting a timer on your washing machine.

Section 6

Planning your solar electricity system

Siting considerations

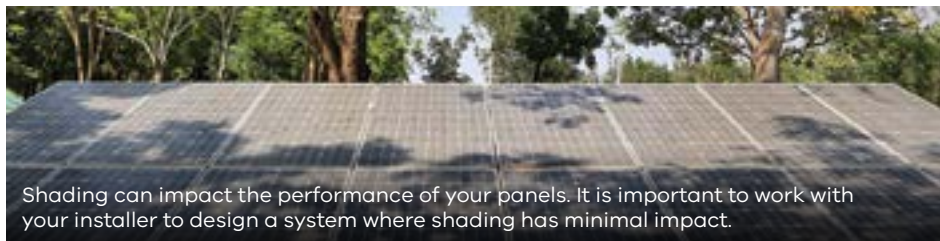
The company you engage for your solar purchase should do an on-site analysis to ensure your site is suitable for solar panels. The following advice will help you get the most out of your solar installation.

Which direction?

Ideally a solar site is a north-facing roof or ground space that is not shaded during the day. Panels may also be mounted on other roof areas, and can face north-east or north-west or even completely east or west. However, the more the panels face away from north, the less solar energy they capture and the less electricity they can produce. For panels on an east- or west-facing roof with a 20° pitch, average daily generation will decrease by up to 15 per cent.

Maximising total system generation is not always the key consideration. Some households may instead want to generate more when they are more likely to be using it, to maximise self-consumption of their system. In this case, arrays facing north-east and north-west may be preferable – generating less overall, and less in the middle of the day, but more in the morning and late afternoon/early evening. Other households may wish to maximise feed-in-tariff (FIT) revenue by facing some panels north, but others west or north-west to take advantage of time-varying FITs. Talk to your installer about the different options.

Where the array consists of panels facing in more than one direction, the array should be electrically split so that each section of the array only consists of panels all facing the same way. In these cases it is usually best to use an inverter with two independent solar array inputs (most modern inverters have this) so that each array section operates independently, without being affected by the other. Using microinverters (explained in *Finding the right inverter*), which make each panel independent from the others, is another solution. DC optimisers (devices that attach to individual panels to improve their output) could be another option in certain situations – ask your installer.



Shading can impact the performance of your panels. It is important to work with your installer to design a system where shading has minimal impact.

Minimal shading

It is important that the panels are not shaded much during the day throughout most of the year, especially in summer. Because of the way panels are connected together in 'strings' (one after the other in series, like fairy lights), if one panel has a shadow across it, its output is reduced and the output of all the other panels in the same string will be reduced by the same amount. If partial shading is unavoidable, the system installer should allow for this, by designing the system so that the shaded panels have the least effect on the rest of the system. This can be done in a similar way to managing arrays facing different directions; by putting all the shaded panels on one string and unshaded panels on another, by using an inverter with two independent solar array inputs; by installing optimisers on shaded panels; or by installing microinverters on each panel.

Microinverters are becoming more common because they maximise power output from solar panels, especially in shade situations. Find out more in *Finding the right inverter*.

Getting the pitch angle right

Panels are often set at the roof angle for aesthetic reasons and to simplify mounting. Slight variations in panel angle don't make that much difference to the annual energy production, so unless you have a radically steep or flat roof angle, mounting panels at the roof angle is usually the best solution. It is important to have a tilt of at least 10° on the panels so that they can be washed clean by rain.

However, the panel angle should be considered if you want to maximise the energy output from your system at certain times of the year, especially if you want to maximise the total annual energy output. To produce as much electricity as possible, angle the panels to maximise summer solar input. To minimise the seasonal variation in generation, angle the panels more steeply to maximise generation during winter, when the sun is at its lowest and weakest. This approach is more common for off-grid systems, but if this is your goal you can work this out with your installer. Speak to your installer to discuss the optimal angle for your situation. Remember, the cost of angling panels more precisely may be more than the value of the additional energy generated.

Section 7

Finding the right installer and steps to installation

A good installer can help you plan a system for your home that's sized for your needs and positioned to generate as much electricity as possible to lower your bills.





Keep in mind the following steps to installing a solar PV system at home.

Steps to purchase, install and connect a solar PV system at home

- Read this *Buyers Guide* to learn about solar electricity systems. The Clean Energy Council's [Guide to installing solar for households](#)²⁵ or SolarQuotes' free online version of their [Good Solar Guide](#)²⁶ are other good sources of information. Gather your questions and seek independent advice.
- Confirm your own household's requirements – see the section on *Planning your solar electricity system*.
- Seek recommendations on installers or companies that manage installation, and then contact those who are appropriately accredited for quotes.
- Select your preferred installer. Make sure the quote meets your needs, using our *checklist* can help.
- Confirm that your system can be connected to the grid
- Apply for the [solar panel \(PV\) rebate](#)²⁷.
- Install your new system.
- Connect to the grid, arranged by your installer.
- Enjoy your new system and reduced energy bills.

²⁵ <https://www.solaraccreditation.com.au/consumers/purchasing-your-solar-pv-system/solar-pv-guide-for-households.html>

²⁶ <https://www.solarquotes.com.au/good-solar-guide/contents/>

²⁷ <https://www.solar.vic.gov.au/Solar-rebates/Solar-Panel-Rebate>

Section 7

Finding the right installer and steps to installation

Finding a retailer or installer

As with all major purchases, you should carefully consider both price and quality when buying a system.

Always get at least three Clean Energy Council Approved Solar Retailers to quote for the same size system so you are able to compare prices, makes, models and warranties. When comparing prices, note that a quality system may cost more, but that this may be a cost that's worthwhile for a system with a long and useful life. Always ask for details on the type and quality of solar panels and inverter.

Websites such as [Solar Quotes](https://www.solarquotes.com.au)²⁸ can make it easy to obtain multiple quotes without having to ring around.



Clean Energy Council Approved Solar Retailers

The Clean Energy Council (CEC) is a peak body for Australian clean energy businesses, including solar and battery retailers. It has developed a Solar Retailer Code of Conduct as a way for solar businesses to show their commitment to responsible sales and marketing activities and solar industry best practice. CEC Approved Solar Retailers are solar retailers who have promised to follow this Code of Conduct when doing business.

All retailers taking part in the Solar Homes Program are required to be signatories to the CEC Retail Code of Conduct.

Solar Victoria requires applicants to the program to use an Approved Solar Retailer for their system installation if they intend to claim a rebate.

²⁸ <https://www.solarquotes.com.au>



Solar Savvy Tip: Always get at least three Clean Energy Council Approved Solar Retailers to quote for the same size system. Note that a quality system may cost more, but this may be a cost that's worthwhile for a system with a long and useful life.

Many retailers are already Approved Solar Retailers. Customers of these retailers can be confident they are getting clear, honest information, quality installation, and good warranties. Requiring all businesses to be Approved Solar Retailers would protect consumers from questionable providers and help establish a more level playing field for the solar installation industry.

Check the CEC's [Approved Solar Retailer webpage](#)²⁹ for a list of Approved Solar retailers in your area.

Clean Energy Council Accredited Installers

The person who installs your system needs to be accredited. Grid-connected and stand-alone solar systems with 230 volt wiring have to be installed by a Clean Energy Council Accredited Installer. Systems with batteries require a CEC Accredited Installer with either an additional battery endorsement, or stand-alone installation accreditation.

Solar Victoria also requires installers to hold an unrestricted Class A Electrical Licence registered with Energy Safe Victoria.

Check the [CEC's Accredited Installer webpage](#)³⁰ for a list of accredited installers in your area.

How to be sure of quality?

You can be more confident in a solar retailer or installer if they provide you with a written quote and undertake a detailed generation analysis onsite, as part of a free 'no-obligation' quote. You should ask about the maintenance and operation requirements of your system, and don't be rushed into making a decision.

You could also search for a potential retailer or installer online to see if there are complaints from other consumers, or ask for references.

²⁹ <http://www.solaraccreditation.com.au/retailers/approved-solar-retailers.html>

³⁰ <http://www.solaraccreditation.com.au/consumers/find-an-installer.html>

Section 7

Finding the right installer and steps to installation

Consider how system faults will be handled

A warranty is only as good as the company that provides it. If the company disappears in a few years, you might have difficulty making a warranty claim should failures occur. It's not possible to know the future of any solar panel manufacturer or installer, as some of the biggest players over the years have simply disappeared. Seeking out a retailer or installer with a long history in the business helps.

Also, be aware that under Australian Consumer Law, warranties are required to be honoured by product manufacturers even if retailers have gone out of business, so make sure you receive and keep information about the manufacturers of all the different components of your system, and the different warranties on each component. See ***What warranties are available*** for more information.

Consumers have specific rights under the Australian Consumer Law (ACL), regardless of any other warranty provided by the supplier or manufacturer. For more information about your rights visit: www.consumer.vic.gov.au/products-and-services/refunds-repairs-and-returns/warranties

What not to do when engaging an installer or company

Installing a solar PV system is something that you want to get right: after all, you only get one shot at the rebate, and a well-installed system with quality parts can continue to save you money for many years to come. A poorly-installed system or one with cheap components can be nothing but trouble.

Don't buy a solar panel (PV) system from a door-to-door salesperson, or from a salesperson who cold calls you on the phone. If you have signed a contract in this way, take advantage of the 10-day cooling off period under consumer law to cancel the contract, and then take your time to do your homework, plan your system and find a quality installer.

Do not make any payment to a solar provider until your eligibility has been confirmed by Solar Victoria. Apply for an eligibility number on the [solar panel \(PV\) rebate page](#)³¹.

Solar scams do exist unfortunately, with offers too good to be true. Visit the ACCC's SCAMwatch website [for more information on protecting yourself from scams](#)³².

³¹ <https://www.solar.vic.gov.au/Solar-rebates/Solar-Panel-Rebate>

³² <http://www.scamwatch.gov.au/get-help/protect-yourself-from-scams>



If you are the target of a scam, please report it to the Australian Competition and Consumer Commission (ACCC) via the SCAMwatch website³³ or by calling 1300 795 995.

³³ <https://www.scamwatch.gov.au/content/index.phtml/itemId/694011>

Section 7

Finding the right installer and steps to installation

What to look for in a quotation

There are a number of details to check in any quotation for a new solar PV system.

Check the panel's performance specifications are what you're after (see section on **panel wattage** for more).

Other factors to consider include construction quality, frame type and colour, panel dimensions and weight. Some panels may be more suited to your roof shape than others, especially when used on small buildings such as sheds.

Also bear in mind that different types of solar panels look different. Thin film panels have a uniform, plain appearance, while crystalline panels have distinct cells – sometimes quite obvious (they may have dark coloured cells on a white background, for instance), while others are designed to make the appearance of the cells less obtrusive. If appearance is a concern, make sure you see good photos of the panels before purchasing. Ask the installer if they have any photos of complete installations with those panels.

Check datasheets carefully for information on different versions of the same panel, and make sure you will be buying panels with all the features you are expecting to get. Talk to the supplier/installer and get a full part number for the panels, including any part number suffixes—that way you can be sure you know which variation of panel you are receiving. Also check out the manufacturer. Refer to the information in the **Advice on panel quality and selection** section for further advice).

Obviously, you want a long warranty. Pretty much all panels now have at least a 10-year materials warranty and 25-year power warranty. Find out more about warranties in **What warranties are available**.

Inverters have their own separate warranties, usually between two and ten years. Ten year warranties are becoming more common, and while these inverters will probably be a little more expensive than ones with shorter warranties, it could well prove worth it in the long run.

Regardless of warranties, you can expect that the inverter will fail at some point, probably well before the panels do. You can also be reassured that if an inverter does need out-of-warranty replacement after ten years, the solar system is likely to have already paid itself back and saved you more (through lower bills) since reaching payback than the inverter replacement cost.

Also consider the mounting system and how it will appear on your roof, if that's an issue for you. Systems that use racking usually have the rack rails extending past the edges of the solar array, and this can look unsightly if the array is in a very obvious position. Mounting systems that require no rails might be the better option, but these may be available only for certain panels that have the appropriately designed frames. But this choice depends on what your chosen installer usually uses for panel mounting—they will have a preferred system and may be reluctant to use anything else.



Section 7

Finding the right installer and steps to installation

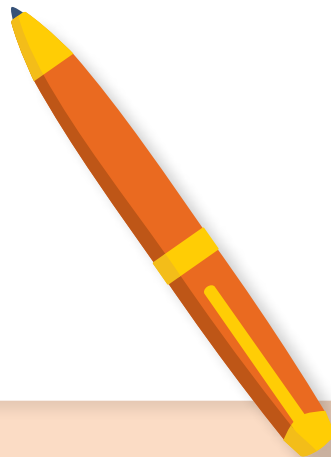
Installer and quotation checklist

It's worth considering the following when reviewing a quoted system:

- What is the total purchase price for a (XX) kW system?
- Is there a deposit required?
- Does someone inspect the property first to check the site is appropriate and whether extra installation costs might apply?
- What is the total waiting period from sign-up to installation?
- How many panels are required for a (XX) kW system and what size is each panel (in watts)?
- How many square metres will the panels require? What is the length/width of each panel?
- What is the brand and type of solar panels and where are they made?
- What is the average daily and yearly kWh production for this system?
- What brand is the inverter and what's its rated capacity?
- Does the inverter have a smaller or larger capacity than the panels or are they size matched?
- What does the inverter display show?
- What accessories, such as remote displays, are available for the solar system?
- Is there a monitoring service so I can check how my system is performing? Is there an extra cost for this?
- What is the warranty on panels, inverter, mounting frame and installation?
- What is the performance warranty on the system?
- How long is the warranty on the selected inverter?
- Are the solar panels and inverter made by the brand name company or are they made by a different manufacturer and relabelled? If so, who is the original manufacturer of the panels and inverter?
- Does the solar panel brand name company that honours the panels' warranty have a base in Australia that I can contact if there are any issues with the panels? Also are there details of the company that honours the inverter warranty, if different? What are the phone numbers and addresses?



- For how long have the solar panel and inverter brand name companies been selling these products?
- How does the panel efficiency compare on quoted systems?
- What power tolerances are offered on panels within quoted systems?
- If the system is significantly cheaper or more expensive than average, why?
- What is the total cost of any insurance coverage before discounts and rebates? (Find out more about insurance in the **Panel warranty from manufacturer** section).
- What sort of after-sales service is available for trouble-shooting issues?
- What is the CEC accreditation number for solar installation?
- Do the panels have Clean Energy Council approval?
- Will the installer organise metering and switchboard modification, including the inspection and paperwork?
- Does the installer organise the application for the Federal Government STC subsidy? The homeowner will need to apply for the Victorian Government's Solar Panel Rebate.
- Is the installation work contracted out?
- For how long has the company been installing solar photovoltaic systems?
- Can the installer/company provide contact details of people who they have installed solar systems for, who would be happy to give a reference about their work?



Section 8

What warranties are available?

Any solar panel worth buying will come with a long warranty. The working life of a solar panel should be in excess of 25 years and many panels come with a 25-year performance warranty. There are several warranty types to consider.

Panel warranty from manufacturer

Most panel warranties have two parts—a construction/materials warranty and a power output warranty. The first covers the actual manufacturing quality of the panel and warrants the panels to be free of manufacturing and materials defects for a given time, usually 10 years or so, but some manufacturers provide manufacturing warranties up to 25 years or more. The performance warranty covers the actual panel power output, and is given in the form of a percentage after a certain number of years. For example, a power output warranty might state that a panel will still produce 90% of its rated output after 10 years and 80% after 25 years.

Or it might be stated as a linear warranty with just one figure, say 85% after 25 years. Any high-quality panel would be expected to still produce at least 80% of its original rating after 25 years.

Under Australian consumer law importers are responsible for manufacturers' warranties, so it's important to know who your importer is because sending the panels back to the country of manufacture would be impractical.

To guard against this issue some manufacturers provide prepaid insurance at no extra cost, which ensures the warranty will be honoured even if the manufacturer goes out of business. Others provide comprehensive insurance, at an extra cost, which covers just about everything from theft to failure for a period of a few years.

WARNING: Remember to read the fine print on all insurance policies, including excesses. If the manufacturer pays for their product insurance annually, rather than it being prepaid in full, the insurance may lapse after the company becomes insolvent, meaning you can lose both warranty and insurance coverage.



Inverter warranty

A good quality inverter should last at least 10 years, if installed properly, and given no accidents such as lightning strikes. Lifespan will vary, depending on a number of factors including ambient temperature, mains grid voltage and mains power quality. Many large electrical spikes, caused by large loads like electric motors, can eventually cause damage to even the best equipment. Other factors that can affect lifespan are dust, heat, ventilation and pests or vermin such as mice or ants. To guard against the cost of an early failure look for long inverter warranties. Five years is a suggested minimum. A five-year warranty with the option of buying an extra five-year warranty is often available and can be good value and offer peace of mind.

Installation warranty

Another important aspect of the warranties is the installation or workmanship warranty. This is the part of the warranty that is the responsibility of the system installer and covers their workmanship as opposed to the panels or inverters within the system.

It is also important to understand whether the installer or solar retailer will assist in enacting any manufacturer warranties should a fault occur with a major system component.



Remember to read the fine print on all insurance policies, including excesses. If the manufacturer pays for their product insurance annually, rather than it being prepaid in full, the insurance may lapse after the company becomes insolvent, meaning you can lose both warranty and insurance coverage.

Section 9

Consumer protections when buying a solar panel (PV) system

If you have a problem with a solar panel (PV) system installed at your home, you have rights to protect you as a consumer. This includes the rights you have under Australian Consumer Law, and additional entitlements under the Clean Energy Council's Solar Retailer Code of Conduct, which CEC Approved Solar Retailers have promised to adhere to. Only Approved Solar Retailers are able to participate in the Solar Homes Program.

Your consumer rights

Australian Consumer Law has rules for responsible marketing and selling, products being fit for purpose, and warranties being honoured. The Solar Retailer Code of Conduct has higher standards in these areas. It also has requirements for Approved Solar Retailers with regard to dealing with problems and complaints.

When you buy a system find out who you should contact if there is a fault, and be aware of the warranties available with your system.

If you have a problem with a product, service or unfulfilled contract try to resolve it directly with the company first. Putting your complaint in writing gives you records of your dealings with it.

If you are unable to contact the business, or you do not receive a satisfactory response within a reasonable time, you could lodge a complaint with Consumer Affairs Victoria, who may be able to assist.



The Solar Energy page on the [Consumer Affairs Victoria website](https://www.consumer.vic.gov.au/products-and-services/energy-products-and-services/solar-energy)¹ has advice on the next steps, from dealing with a faulty product such as a solar inverter, problems with installation and dealing with insolvent businesses.

You may also choose to take your complaint further by applying to a court or tribunal, such as the Victorian Civil and Administrative Tribunal (VCAT), or seek your own independent legal advice.

Below are some handy contacts regarding who to contact to protect your consumer rights:

Consumer Affairs Victoria (CAV):

You can contact CAV to help resolve disputes between you, the customer, and traders. CAV enforces compliance with consumer laws.

T: 1300 55 81 81
www.consumer.vic.gov.au

Energy & Water Ombudsman Victoria (EWOV):

You can contact EWOV to investigate any customer complaint about electricity, natural gas, bottled gas (LPG) and water companies.

T: 1800 500 509 (free call) or 131 450 (interpreter service)
www.ewov.com.au

Essential Services Commission (ESC):

You can contact ESC for issues relating to the price, quality and reliability of essential services such as electricity.

T: 1300 664 969 or (+61 3) 9032 1300
www.esc.vic.gov.au

¹ <https://www.consumer.vic.gov.au/products-and-services/energy-products-and-services/solar-energy>

Ensuring safety in the Solar Homes program

The Solar Homes program requires the highest standards in safety, which is the responsibility of workers and their employers who must ensure their teams are trained, supervised and equipped to do the job safely.

Only licensed electricians, accredited by the Clean Energy Council are permitted to complete solar installations, with every system checked by a licensed electrical inspector.

Solar Victoria is implementing an independent, risk-based audit program conducted post-installation to check thousands of systems to gauge overall compliance with industry practices.

Post-installation audits assess electrical safety, confirms the equipment installed is what was quoted for, and that the installer was approved by the Clean Energy Council to do the work. It also confirms that the inspection by the Licensed Electrical Inspector was done correctly.

WorkSafe Victoria and Energy Safe Victoria are also conducting inspections at the time of installation with a particular focus on fall protection.

An enforcement committee comprising various regulators (WorkSafe Victoria, Energy Safe Victoria, Consumer Affairs Victoria, Victorian Building Authority) and the Clean Energy Council reviews each matter to determine if further action is needed.

This Buyers Guide was developed in conjunction with Renew.



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